



# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### Improvements in or relating to Photographic Cameras

I, LUCIEN JULES EMILE ANDRÉ DODIN, a French Citizen of Rue Tixador, La Canet-Plage (Pyr. Or.), France, do hereby declare the invention for which I

5 pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to photographic cameras employing reflecting mirrors for redirecting the image-forming rays passing through the objective onto a light sensitized surface arranged in the front portion of the camera, thereby to obtain a reduction in the camera dimension in the direction of the optical axis of the objective. Such cameras are hereinafter referred to as "cameras of the kind specified".

20 A photographic camera of the reflex kind, with a small dimension in the direction of the optical axis of the objective has previously been proposed in which the image forming rays passing through the objective are reflected by two mirrors onto a sensitized image reception surface located at the front of the camera one of the mirrors being movable to enable the rays to be reflected by the mirrors either to the said surface or to a focussing screen.

35 In attempting to design a camera of the kind specified, with a view to keeping the aforesaid dimensional depth of the camera as small as possible, I have experienced the difficulty that when the sensitized surface is located at the front of the camera with one edge close to the objective so as to promote space economy, light entering the objective may pass to the sensitized surface after reflection from one only of the mirrors and thus prevent a clear image formation. The difficulty is present particularly when using objectives having a large aperture, e.g., of the order of  $f/4.5$ .

45 The present invention aims to provide an improvement in this respect.

[P.]

To this end there is provided according to the present invention a photographic camera of the kind specified constructed so that in use the light sensitive image-reception surface is disposed in the front portion of the camera, facing the rear of the camera, and with one edge close to the objective, the camera comprising first and second plane mirrors so disposed that light entering through the objective is reflected by the first of the mirrors on to the second and from the second to the said image-reception surface, and a partition or baffle disposed at or near the said edge of the image-reception surface, between the latter and the objective, for preventing the passage of light onto the said surface after reflection from the first only of the said mirrors.

70 The invention may be applied in connection with a camera of the reflex kind in which for the purpose of focussing, the light rays are reflected to a focussing screen by means of a reflector which can subsequently be moved to allow the rays to pass to the sensitized surface. According to a preferred feature of my invention, in such a camera I arrange one of the two reflecting mirrors for movement so that in one position it reflects the rays from the other mirror to the sensitized surface and in another position it shields the sensitized surface from light and allows the rays to pass directly from the said other mirror to the focussing screen. Preferably the movements of the mirror as aforesaid will automatically operate a photographic shutter e.g., a pivoted blade shutter associated with the objective so that the shutter is opened as the mirror moves into a position permitting focussing.

85 A reflex type camera embodying the invention, and of particularly small dimensions, can be produced by arranging the focussing screen so that it can itself be folded inwards when the camera is out of use. The camera may have a

viewing hood which can be folded flat against the focussing screen.

The invention will be more clearly understood by referring to the accompanying diagrammatic drawings which show, by way of example, two embodiments thereof and in which:—

Fig. 1 is a sectional view taken on a transverse plane passing through the optical axis of a photographic camera according to the present invention, in a simple form, and

Figs. 2 and 3 are two sectional elevational views on a plane passing through the optical axis of a reflex camera embodying the invention.

Referring to Fig. 1, 1 is the objective of the camera having a shutter device of a type known *per se*. The innermost lens of the objective has its rear contour diagrammatically shown at 2. For the purpose of comparison of dimensions, there is shown, in the plane of the paper, the path of a beam of light passing from the node of emergence  $N_2$  to form an image A—B at the distance  $N_2M$ .

The ray of light 3 entering the lens along the optical axis is reflected at 4 by a first mirror 5 and thereafter at 6 by a second mirror 7 from which the ray is reflected parallel to 3, but in the opposite direction, and finally reaches the center  $M_2$  of the sensitized surface 8 disposed at the front of the camera with one edge adjacent the objective.

In the example shown, the mirrors 5 and 7 form a dihedron having an angle of  $90^\circ$  the edge of the dihedron being parallel to the sensitized surface which lies in a plane perpendicular to the optical axis 3. In these conditions, the relative positions of the mirrors 5, 7 are such that the entire image forming beam, forming the image A—B, is intercepted by the mirror 5 and reflected from the latter on to the mirror 7 from which it is entirely reflected upon the sensitized surface 8 extending from  $A_2$  to  $B_2$ .

In order to prevent the passage of light to the sensitized surface after reflection from the mirror 5 only, a partition 11, of convenient height, is interposed between the sensitized surface 8 and the objective.

The arrangement permits the body of the camera to be of the dimensions indicated by dash-and-dot lines. The dimensions which would be necessary if the image forming rays passed directly from the objective to the sensitized surfaces are indicated by the dotted lines.

In the example shown, the two mirrors 5, 7 are disposed at right angles. It is possible to incline the mirrors at other than a right angle one to the other in

which case the sensitized surface will not be in a plane perpendicular to the optical axis 3.

By mounting the mirrors 5 and 7 on hinges, so that they can fold to lie against the sensitized surface, space economy can be further promoted.

Referring now to the embodiment of the invention illustrated in Figs. 2 and 3, Fig. 2 shows the camera with its reflex observation hood closed, but with its mirrors 5 and 7 in picture taking position in which light rays are reflected onto the sensitized surface 8.

The mirror 5 is stationary, while the mirror 7 is movable within the camera body 12.

The mirror 7 may be swung, about an axle 21 perpendicular to the plane of the paper, into the position  $7^1$  in which it is held by an engaging device (not shown) against the action of a spring (not shown) operating to urge the mirror into position 7.

In this embodiment, the light baffle preventing the passage of rays to the sensitized surface after reflection from mirror 5 alone, is designated 22.

When the mirror 7 is swung from its picture-taking position towards the sensitized surface, it operates to shield that surface from light when it reaches position  $7^{11}$ . During the final part of its movement from  $7^{11}$  to  $7^1$  the mirror 7 acts, through the intermediary of connecting means diagrammatically indicated by the arrow 23, upon the leaves 24 of the shutter so as to move these to open positions  $24^1$  as shewn in Fig. 3.

Behind the picture-taking position of mirror 7, there is disposed a ground glass 25 which is adapted to be swung about an axle 26 and behind which there are located the parts of a folding observation hood 27. The screen and hood can be folded into a housing portion 28 provided in the apparatus body 12 and closed by a cover 29 mounted on hinges (Fig. 2—3). When the cover 29 is opened into its position  $29^1$ , as shewn in Fig. 3, resilient and abutment means (not shown) cause the hood to spread out as in indicated by reference  $27^1$ , while the ground glass screen 25 moves into the position  $25^1$  perpendicular at 30 to the path of the light ray reflected from mirror 5 after entering the objective along its optical axis. The image focused upon the ground glass  $25^1$  is viewed at the bottom of the hood  $27^1$ .

The return of the mirror 7 from its position  $7^1$  to its picture taking position is effected by known means and is accompanied by closing of the objective shutter so that the latter is ready for normal picture taking operation.

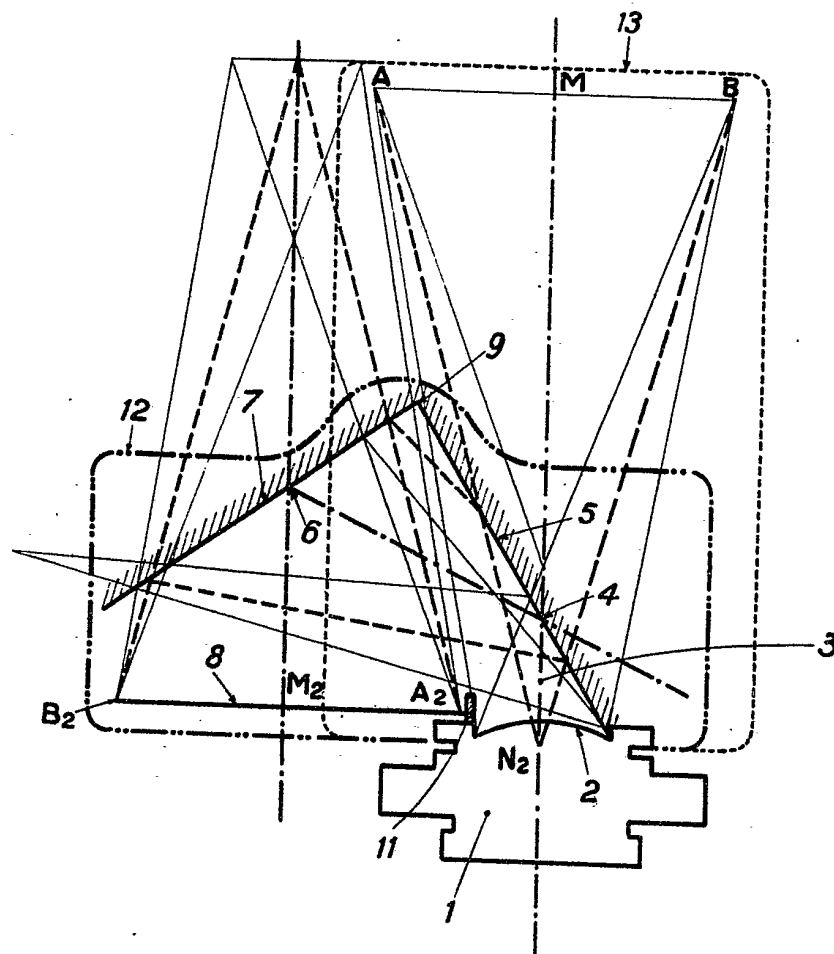
What I claim is:—

1. A photographic camera of the kind specified constructed so that when in use the light sensitive image-reception surface is disposed in the front portion of the camera, facing the rear of the camera, and with one edge close to the objective, the camera comprising first and second plane mirrors so disposed that light entering through the objective is reflected by the first of the mirrors on to the second and from the second to the said image-reception surface, and a partition or baffle disposed at or near the said edge of the image-reception surface, between the latter and the objective, for preventing the passage of light onto the said surface after reflection from the first only of the said mirrors.
2. A photographic camera according to claim 1 in which one edge of the first mirror extends substantially up to the objective.
3. A photographic camera according to claim 1 or 2 embodying a focussing screen mounted in the camera and in which the second of the mirrors is arranged for pivotal movement, the construction being such that the second mirror can be moved away from a position between the first mirror and the said screen into a position in which it shields or assists in shielding the light sensitized surface from light, the first of said positions corresponding to picture-taking position in which the light entering the objective is reflected according to claim 1 and the second of said positions corresponding to focussing position in which said light is reflected from the first mirror directly onto the focussing screen.
4. A photographic camera according to claim 3, in which the second mirror is arranged automatically to operate a photographic shutter in its pivotal movements so that the shutter is closed ready for picture-taking operation when the second mirror is in its light reflecting position, and open for focussing when the mirror is in its other position in which it shields or assists in shielding the sensitized surface from light.
5. A photographic camera according to claim 3 or 4, comprising a foldable viewing hood adapted to be held in folded condition when the camera is not in use and constructed so as when unfolded to shroud the focussing screen.
6. A photographic camera according to claim 5 comprising a hinged cover adapted when closed to cover the folded viewing hood and when opened to permit the hood to unfold into operative position.
7. A photographic camera according to claim 5 or 6 wherein the focussing screen is movable inwards from its operative position to promote space economy in the out of use state of the camera.
8. A photographic camera substantially as herein described with reference to and as illustrated in Fig. 1 of the accompanying drawings.
9. A photographic camera substantially as herein described with reference to and as illustrated in Figs. 2 and 3 of the accompanying drawings.

Dated this 29th day of August, 1950.

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*Fig.1*



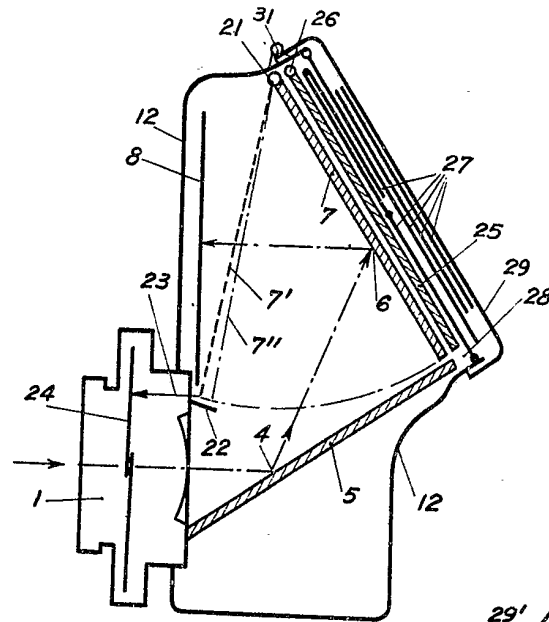


Fig. 2

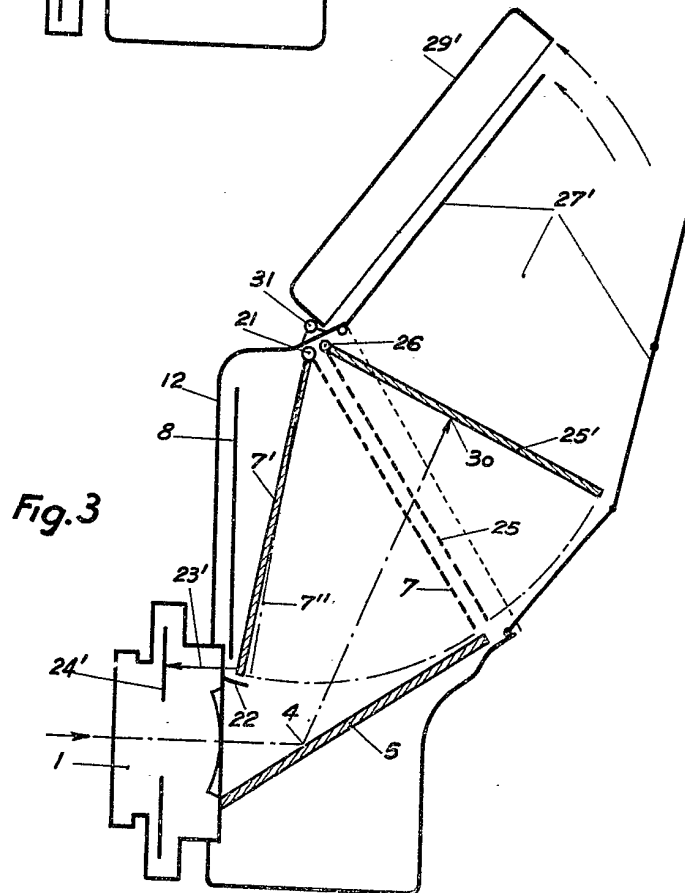


Fig. 3